

WHAT IS CLAIMED IS:

1. In an apparatus for inputting data by use of keys in a portable terminal, a rotation key device comprising:

5 a base plate attached, at a lower surface thereof, to an upper surface of a first printed circuit board (PCB) mounted in a body of the portable terminal;

a second PCB attached, at a lower surface thereof, to the upper surface of the base plate, the second PCB being provided with a plurality of first dome switches and a second dome switch at the lower and upper surfaces thereof, and with a plurality of
10 contact surfaces along the circumference of the second dome switch, for receiving an electrical contact signal in either a fixed or rotated state of a contact terminal and thus sensing the rotated position of the contact terminal according to the rotation direction thereof;

a ring-shaped washer attached to the upper surface of the second PCB;

15 a rotation key supported by an upper surface of the ring-shaped washer so that the rotation key is rotatable in forward and reverse directions by an external force applied thereto;

a contact plate provided in the rotation key to rotate along with the rotation key, the contact plate having a plurality of contact terminals each adapted to come into
20 contact with one of the contact surfaces of the second PCB and to generate an electrical signal from a rotation contact and a fixed contact of the rotation key and apply the electrical contact signal to each of the contact surfaces coming into contact therewith; and

a fixed button coupled centrally with the rotation key so that the rotation key is
25 rotatable.

2. The rotation key device according to claim 1, wherein the base plate has a substantially circular disc structure substantially centrally provided with a pair of coupling holes, a through hole in the vicinity of the coupling holes to extend a flexible
30 PCB therethrough, and an insertion hole to allow the second PCB to extend therethrough.

3. The rotation key device according to claim 1, wherein the first and second dome switches are provided with a plurality of support members to facilitate the operation of the dome switches in contact with the dome switches.

5 4. The rotation key device according to claim 1, further comprising:
a first bonding member between the first PCB and the base plate, for attaching the base plate to the first PCB;
a second bonding member between the second PCB and the ring-shaped washer, for attaching the ring-shaped washer to the second PCB; and
10 first and second switching bonding members on the lower and upper surfaces of the second PCB, for attaching the first and second dome switches to the lower and upper surfaces of the second PCB.

5. The rotation key device according to claim 1, wherein each of the
15 switching bonding members is centrally provided with a pair of coupling holes to allow a fixing member of the fixed button to extend therethrough.

6. The rotation key device according to claim 1, wherein the second PCB is further provided with:
20 a pair of coupling holes formed at a central portion of the second PCB;
a plurality of light emitting diodes (LEDs) arranged at predetermined positions along the circumference of the second PCB;
the flexible PCB at a predetermined position of the second PCB, for applying a contact signal of the second PCB to the body; and
25 a contact portion arranged at a predetermined position on a circumference of the second PCB, to come into contact with the flexible PCB.

7. The rotation key device according to claim 1, wherein the contact surfaces comprise:
30 a plurality of first contact surfaces formed at the upper surface of the second PCB so that the first contact surfaces are circumferentially arranged to be substantially uniformly spaced apart from one another, each of the first contact surfaces receiving an

electrical contact signal from one of the contact terminals coming between first contact surfaces along with rotation of the contact terminal; and

5 a plurality of second contact surfaces inside the first contact surfaces, the second contact surfaces being provided with a plurality of inserted contact surfaces formed around the circumference of the second contact surfaces, each of the inserted contact surfaces receiving an electrical contact signal from one of the contact terminals coming between inserted contact surfaces along with rotation of the contact terminal.

8. The rotation key device according to claim 1, wherein each of the
10 contact surfaces is elongated or shortened to control the sensing speed of the contact terminals along with the rotation of the rotation key.

9. The rotation key device according to claim 1, wherein the contact terminals of the contact plate comprise:

15 a pair of first contact terminals, each for generating an electrical contact signal when the first contact terminal comes into contact with one of the first contact surfaces and the inserted contact surfaces; and

a pair of second contact terminals, each for supporting the first contact terminals, in contact with one of the second surfaces.

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10. The rotation key device of claim 1, wherein the contact plate further has a through hole formed at a substantially central portion of the contact plate to allow the fixing member of the fixed button to extend therethrough.

25 11. The rotation key device according to claim 9, wherein each of the plurality of contact terminals of the contact plate is formed by cutting out a desired portion of the contact plate to leave a portion corresponding to the contact terminal, and then bending the portion corresponding to the contact terminal to be protruded toward the rotation key, and each of the plurality of contact terminals has a plate shape so that
30 the contact terminal comes into contact with one of the first and second contact surfaces of the second PCB.

12. The rotation key device according to claim 1, wherein the plurality of contact terminals are substantially symmetrically arranged to face each other, and the facing ones of the plurality of contact terminals cross each other.

5 13. The rotation key device according to claim 9, wherein each of the first and second contact terminals has, at a free end thereof, a bent portion adapted to allow the contact terminal to come into contact with one of the contact surfaces.

14. The rotation key device according to claim 1, wherein the contact
10 plate is made of a stainless steel material.

15. The rotation key device according to claim 1, wherein the rotation key comprises:

an upper case and a lower case;

15 fitting holes, each formed at a center portion of the upper or lower case to allow the fixed button to fit thereinto;

a first step centrally formed in the upper case, to couple the rotation key to the fixed button so that the rotation key is rotatable;

a second step centrally formed in the lower case, to couple the rotation key to
20 the fixing member of the fixed button so that the rotation key is rotatable; and

a case bonding member between the upper and lower cases, for attaching the lower case to the upper case.

16. The rotation key device of claim 1, wherein the fixed button further
25 comprises:

a fixing member under the fixed button, for extending through the second PCB, the ring-shaped washer and the contact plate sequentially, coupling one another;

a pair of coupling protrusions formed at the fixed member, for extending through the through hole of the contact plate, the coupling holes of the second PCB, the
30 coupling holes of the base plate, and the coupling holes of the switch bonding members, coupling one to another; and

a through hole formed at a center portion of the fixed member, for allowing a

supporting portion at the rear surface of the fixed button to extend therethrough and come into contact with the second dome switch.

17. The rotation key device of claim 16, wherein each of the coupling
5 protrusions has, at the tip thereof, a bending portion to be coupled to the rear surface of the base plate.

18. In an apparatus for inputting data by use of keys in a portable terminal, a rotation key device comprising:

10 a base plate attached, at a lower surface thereof, to an upper surface of a first printed circuit board (PCB) mounted in a body of the portable terminal, the base plate being substantially centrally provided at an upper surface thereof with a plurality of coupling protrusions;

a second PCB attached, at a lower surface thereof, to the upper surface of the
15 base plate while allowing the coupling protrusions to extend therethrough, the second PCB being provided at the lower surface thereof with a plurality of dome switches, and at an upper surface thereof with a plurality of contact surfaces for receiving an electrical contact signal at either a rotated position or a fixed position of a contact terminal and sensing the rotated position of the contact terminal according to the rotation direction of
20 the contact terminal;

a ring-shaped washer attached to the upper surface of the second PCB;

a rotation key supported by an upper surface of the ring-shaped washer so that the rotation key is rotatable in forward and reverse directions by an external force applied thereto;

25 a contact plate coupled to an upper surface of the rotation key to rotate along with the rotation key, the contact plate having a plurality of contact terminals each adapted to come into contact with one of the contact surfaces of the second PCB and to generate an electrical contact signal at a rotation contact or a fixed contact of the rotation key; and

30 a fixed button coupled with a center portion of the upper surface of the second PCB.

19. The rotation key device according to claim 18, further comprising:
a first bonding member between the first PCB and the base plate, for attaching the base plate to the first PCB;
a second bonding member between the second PCB and the base plate, for
5 attaching the second PCB to the base plate;
a third bonding member between the second PCB and the ring-shaped washer, for attaching the ring-shaped washer to the second PCB; and
a fourth bonding member between the second PCB and the fixed button, for attaching the fixed button to the second PCB.

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20. The rotation key device of claim 18, wherein the base plate has a substantially circular disc structure substantially centrally provided with the coupling protrusions.

15 21. The rotation key device according to claim 18, wherein each of the plurality of coupling protrusions of the base plate has, at a free end thereof, a jaw extending substantially horizontally toward a center of the base plate, the jaw being forcibly extended through an associated one of first through holes formed at the second PCB, and then engaged with the second PCB around the associated through hole.

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22. The rotation key device according to claim 18, wherein the base plate is further provided with:

a plurality of substantially uniformly spaced arc-shaped grooves formed along a circumference of the base plate so that the grooves are engagable with a
25 circumferential step formed at the rotation key, thereby allowing the rotation key to be rotatable on the base plate without being separated from the base plate;

a guide groove formed at a desired position on the circumference of the base plate, and adapted to guide a flexible PCB contacting the second PCB; and

a plurality of support portions formed at the base plate, respectively adapted to
30 support the dome switches in a state in which the base plate is coupled with the dome switches.

23. The rotation key device according to claim 21, wherein the jaws are substantially symmetrically arranged to face each other, and the arc-shaped grooves are substantially symmetrically arranged to face each other.

5 24. The rotation key device according to claim 18, wherein the second PCB is further provided with:

a plurality of through holes arranged at a central portion of the second PCB, and adapted to allow the coupling protrusions to extend therethrough; and

10 a contact portion arranged at a desired position on a circumference of the second PCB, and adapted to come into contact with the flexible PCB.

25. The rotation key device according to claim 18, wherein the contact surfaces comprise:

15 a plurality of first contact surfaces formed at the upper surface of the second PCB so that the first contact surfaces are circumferentially arranged to be substantially uniformly spaced apart from one another, each of the first contact surfaces receiving an electrical contact signal from one of the contact terminals coming between first contact surfaces along with rotation of the contact terminal; and

20 a plurality of second contact surfaces inside the first contact surfaces, the second contact surfaces being provided with a plurality of inserted contact surfaces formed around the circumference of the second contact surfaces, each of the inserted contact surfaces receiving an electrical contact signal from one of the contact terminals coming between inserted contact surfaces along with rotation of the contact terminal.

25 26. The rotation key device according to claim 25, wherein each of the contact surfaces is elongated or shortened to control the sensing speed of the contact terminals along with the rotation of the rotation key.

27. The rotation key device according to claim 18, wherein the contact
30 terminals of the contact plate comprise:

a pair of first contact terminals, each for generating an electrical contact signal when the first contact terminal comes into contact with one of the first contact surfaces

and the inserted contact surfaces; and

a pair of second contact terminals, each for supporting the first contact terminals, in contact with one of the second surfaces.

5 28. The rotation key device according to claim 18, wherein the contact plate further has a fourth through hole formed at a substantially central portion of the contact plate to allow the coupling protrusions to extend therethrough.

 29. The rotation key device according to claim 27, wherein each of the
10 plurality of first and second contact terminals of the contact plate is formed by cutting out a desired portion of the contact plate to leave a portion corresponding to the contact terminal, and then bending the portion corresponding to the contact terminal to be protruded toward the rotation key, and each of the plurality of contact terminals has a plate shape so that the contact terminal comes into contact with one of the first and
15 second contact surfaces of the second PCB through the third through hole.

 30. The rotation key device according to claim 27, wherein the plurality of first and second contact terminals are substantially symmetrically arranged to face each other, and the facing ones of the plurality of contact terminals cross each other in a
20 rotating direction of the rotation key.

 31. The rotation key device according to claim 27, wherein each of the contact terminals has, at a free end thereof, a bent portion adapted to allow the contact terminal to come into contact with one of the contact surfaces.

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 32. The rotation key device according to claim 18, wherein the contact plate is made of a stainless steel material.

 33. The rotation key device according to claim 18, wherein the
30 rotation key is provided with:

a second through hole formed at a central portion of the rotation key to allow the coupling protrusions to extend therethrough;

a plurality of third through holes formed around the second through hole while extending circumferentially to be substantially uniformly spaced apart from one another, each of the third through holes allowing an associated one of the contact terminals to extend therethrough; and

- 5 a circumferential step extending along a circumference of the rotation key, the circumferential step engaging with the arc-shaped grooves circumferentially formed at the base plate.

34. The rotation key device according to claim 33, wherein the third
10 through holes are symmetrically arranged to face each other.

35. The rotation key device according to claim 18, wherein the fixed button is provided at a circumference thereof with a plurality of coupling grooves respectively engagable with the coupling protrusions of the base plate, in a state where
15 the coupling protrusions sequentially extend through the second PCB, the ring-shaped washer, the rotation key and the contact plate.